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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Uri Banin

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EXAMINER

DULKA, JOHN P

ART UNIT

PAPER NUMBER

2895

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/588,369	Applicant(s) BANIN ET AL.	
	Examiner John P. Dulka	Art Unit 2895	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 August 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 59-62, 65, 67-74 and 81-91 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 59-62, 65, 67-74 and 81-91 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>08/16/2007</u> . | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Status of Application

Examiner notes changes to specification and claims as per amendment filed 6 August, 2009. Pending claims 59-62, 65, 67-74, and 81-91 are rejected below in final office action.

Information Disclosure Statement

The Information Disclosure Statement filed 16 August, 2007 has been considered and initialed in its entirety.

Claim Objections

Claims 65, 73 and 91 are objected to because of the following informalities: Claim 65 states, "is selected" in which examiner believes the word "is" should be deleted; Claim 73 states, "an surfactant" instead of "a surfactant"; Examiner believes claim 91 would better depend on claim 65 not claim 67. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 65 and 67 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claims 65 and 67 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: Claim 65 states that the second material is Group II-VI semiconductors/Group III-V semiconductors/Group IV-VI semiconductors/Group IV semiconductors/ alloys made of these semiconductors/ combinations of the semiconductors in composite structures/ core-shell structures of the above semiconductors: but claim 67 dependent on claim 65 states that the second material is gold-therefore leaving the examiner confused. For purpose of examining claims 65 and 67: the second material is gold and the first material is semiconductor.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 59, 60, 62, 65, 67, 68, 69, 70, 71, 73, 74, 82, 83, 85, 88, 90, and 91 are rejected under 35 U.S.C. 102(b) as being anticipated by Banin in WO 03/097904 A1.

In re claim 59, Banin anticipates; a nanostructure having at least one elongated structure element of a first material **(III-V semiconductor) Fig. 1 pg. 12-13**, said elongated structure element being 100nm in length or less **(50nm) pg. 5 ln. 20-25 and pg. 15 ln. 4 or 18** and having

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at least one end portion being coupled to at least one nanozone **(M) Fig. 1 pg. 13 ln. 9-16**; and

at least other end portion capable of coupling to a further nanozone **pg. 12-14 nanorods formed in solution and therefore are not grown using the VLS method (pg. 4) and therefore may have a (M) on both sides due to the fact that both sides of rod are free**;

wherein said nanozone and further nanozone each being of a second material that differs from said first material in at least one property selected from electrical conductivity, chemical reactivity and composition **(III-V semiconductor versus M) Fig. 1 pg. 12-13**.

In re claim 60, Banin anticipates; wherein the second material is a metal or metal alloy **(M) Fig. 1 pg. 13 ln. 9-16**.

In re claim 62, Banin anticipates; wherein the second material is a semiconductor material **(In) Fig. 1 pg. 13 ln. 11 and pg. 6 ln. 9-18**.

In re claim 65, Banin anticipates; wherein said first and second materials are each a semiconductor material is selected from Group II-VI semiconductors, Group III-V semiconductors **(III-V semiconductor: first material) Fig. 1 pg. 12-13**, Group IV-VI semiconductors, Group IV semiconductors, alloys made of these semiconductors, combinations of the semiconductors in composite structures and core/shell structures of the above semiconductors **(In: second material) Fig. 1 pg. 13 ln. 11 and pg. 6 ln. 9-18 and See 112**

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rejection above.

In re claim 67, Banin anticipates; wherein said first material is CdSe or CdSe/ZnS in a core/shell layered **(CdSe) pg. 25 ln. 11-30 and pg. 5 ln. 25-pg. 6 ln. 2** arrangement and said second material is gold **(Au) Fig. 1 pg. 6 ln. 9-18 and through specification Au is used.**

In re claim 68, Banin anticipates; a method for forming a nanostructure having at least one elongated portion, of a first material **(InAs nanorods) Fig. 1 pg. 13 ln. 9-10**, and a nanozone of a second material on at least one of its end portions **(M is Au catalyst) Fig. 1 pg. 13 ln. 11**, said first and second materials being different in at least one property selected from electrical conductivity, chemical reactivity and composition **(semiconductor versus metal) Fig. 1**, said method comprising:

providing a solution of nanostructures, each nanostructure having composed of at least one elongated structure element of a first material **(pg. 12-13 and pg. 8 letter (a))**;

contacting said nanostructures in solution with an agent of a second material, said agent being selected from a metal source, a metal alloy source, a conductive polymer source, an insulating material source and a semiconductor source **(pg. 12-13 and pg. 8 letter (a)—metal source)**; and

allowing growth of said at least one agent of a second material on at least one end portion of the elongated portion of each of said nanostructures, to thereby obtain nanostructures, bearing at least one nanozone on at least one end portion of said at least one elongated structure **(pg. 8 letters a-c and Fig. 1-2 pg. 13-15).**

In re claim 69, Banin anticipates; wherein said agent is selected from a metal source and a metal alloy source **(pg. 12-13 and pg. 8 letter (a)—metal source)**.

In re claim 70, Banin anticipates; the method according to claim 68, wherein said first material is selected from a semiconductor material **(InAs nanorods) Fig. 1 pg. 13 ln. 9-10**, an insulating material, a metal and a combination thereof.

In re claim 71, Banin anticipates; wherein said first material is a semiconductor material **(InAs nanorods) Fig. 1 pg. 13 ln. 9-10**.

In re claim 73, Banin anticipates; a method for forming an electrically conductive zone on a nanostructure having at least one elongated, said method comprising:

providing an organic solution of semiconductor nanostructures **pg. 8--letter (a) and point (i)**, each nanostructure having at least one elongated structure element **(InAs nanorods) Fig. 1 pg. 13 ln. 9-10**;

contacting said nanostructure in said organic solution with another organic solution comprising a metal or metal alloy source **pg. 8--letter (a) there is a metal source**, a stabilizer and/or an surfactant and/or electron donor **in pg 13 ln. 17 there is a reducing agent and in pg. 16 ln. 5-10 there may be a surfactant**; and

allowing growth of said metal or metal alloy on at least one end portion of the elongated portion of each of said semiconductor nanostructures, to thereby obtain semiconductor

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nanostructures, bearing at least one electrically conductive nanozone of metal or metal alloy on said at least one end portion of said at least one elongated structure **(pg. 8 letters a-c and Fig. 1-2 pg. 13-15).**

In re claim 74, Banin anticipates; the method according to claim 73, wherein said nanostructure is in a form selected from a nanorod, a bipod, a tripod, a tetrapod, a nanowire and a nanotube **throughout specification: nanorod.**

In re claim 82, Banin anticipates; a solution comprising a plurality of nanostructures according to claim 59 **Fig. 1 pg. 12-15 and pg. 8 letters (a)-(b)-(c).**

In re claim 83, Banin anticipates; wherein each of said nanostructures having an elongated structure element comprising at least one end portion coupled to a nanozone **III-V semiconductor versus M) Fig. 1 pg. 12-13.**

In re claim 85, Banin anticipates; wherein one of the end portions of said elongated structure is coupled to a nanozone **(M) Fig. 1 pg. 13 ln. 9-16).**

In re claim 88, Banin anticipates; having two or more end portions **Fig. 1 has two ends.**

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In re claim 90, Banin anticipates; the nanostructure according to claim 59, wherein said first material is selected from the group consisting of a semiconductor material, an insulating material, a metal and a combination thereof **(III-V semiconductor) Fig. 1 pg. 12-13.**

In re claim 91, Banin anticipates; the nanostructure according to claim 67, wherein said Group II-VI semiconductors are alloys selected from the group consisting of CdSe, CdS, CdTe, ZnSe, ZnS, ZnTe, and combinations thereof **(CdSe) pg. 25 ln. 11-30 and pg. 5 ln. 25-pg. 6 ln. 2.**

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 61, 72, 89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Banin in view of Majumdar et al. in U.S. Application Publication 2002/0175408 A1.

Banin teaches of forming nanorods using a solution with a metal source. Banin does not explicitly disclose using a conductive polymer or an insulating material as a second material.

However in re claim 61, Majumdar teaches; wherein the second material is a conductive polymer or an insulating material **(86: sheath) Fig. 9 pg. 5 ¶. 0074-0075: (86) is located at one end tip of (80). Furthermore Fig. 4 (sheath 36/38 may be: semiconductor/polymer).**

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In re claim 72, Majumdar teaches; wherein said nanostructure is selected from a bipod, a tripod and a tetrapod **Fig. 34/35 pg. 15 ¶. 0189. Furthermore it would have been obvious to one having ordinary skill in the art at the time the invention was made for Banin to use any shaded rod.**

In re claim 89, Majumdar teaches; being selected from a bipod, a tripod and a tetrapod **Fig. 34/35 pg. 15 ¶. 0189. Furthermore it would have been obvious to one having ordinary skill in the art at the time the invention was made for Banin to use any shaded rod.**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to recognize that combining Majumdar's invention with Banin's invention would have been beneficial in order to create different shaped rods for particular uses.

Claims 81, 84, 86, and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Banin in view of Mayer in WO 03/091458 A1.

Banin teaches of forming nanorods using a solution with a metal source. Banin does not explicitly disclose a pattern of semiconductor/metal, but Mayer does.

In re claim 81, Mayer teaches; a self assembled construct **Fig. 4-9 pg. 7 ln. 25,** comprising a plurality of nanostructures according to claim 59, wherein each nanostructure is optionally linked to another nanostructure in the construct through its conductive zone.

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In re claim 84, Banin teaches; wherein said elongated structure having two end portions, each being coupled to a nanozone **pg. 12-14 nanorods formed in solution and therefore are not grown using the VLS method (pg. 4) and therefore may have a (M) on both sides due to the fact that both sides of rod are free. Banin's Fig. 1 device is capable of having (M) on both sides.**

In re claim 84, Mayer teaches; wherein said elongated structure having two end portions, each being coupled to a nanozone **(pg. 32 claims 1 and 2) with Fig. 3B-3D; Fig. 3h pg. 2 ln. 19-20 such that the Au tip appears to be on both sides. As such it appears that a metal/semiconductor/metal/semiconductor/metal etc... nanorod may be formed.**

In re claim 86, Banin teaches; the nanostructure according to claim 59, wherein each of the end portions of said elongated structure is coupled to a nanozone **pg. 12-14 nanorods formed in solution and therefore are not grown using the VLS method (pg. 4) and therefore may have a (M) on both sides due to the fact that both sides of rod are free. Banin's Fig. 1 device is capable of having (M) on both sides.**

In re claim 86, Mayer teaches; the nanostructure according to claim 59, wherein each of the end portions of said elongated structure is coupled to a nanozone **(pg. 32 claims 1 and 2) with Fig. 3B-3D; Fig. 3h pg. 2 ln. 19-20 such that the Au tip appears to be on both sides. As such it appears that a metal/semiconductor/metal/semiconductor/metal etc... nanorod may be formed.**

In re claim 87, Banin teaches; The nanostructure according to claim 59, wherein said at least other end portion is coupled to a further nanozone **pg. 12-14 nanorods formed in solution and therefore are not grown using the VLS method (pg. 4) and therefore may have a (M) on both sides due to the fact that both sides of rod are free. Banin's Fig. 1 device is capable of having (M) on both sides.**

In re claim 87, Mayer teaches; the nanostructure according to claim 59, wherein said at least other end portion is coupled to a further nanozone **(pg. 32 claims 1 and 2) with Fig. 3B-3D; Fig. 3h pg. 2 ln. 19-20 such that the Au tip appears to be on both sides. As such it appears that a metal/semiconductor/metal/semiconductor/metal etc... nanorod may be formed.**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to recognize that combining Mayer's invention with Banin's invention would have been beneficial in order to create different a functioning device using the nanorods.

Response to Arguments

1. Pg. 10 of applicant's arguments regarding the IDS has been answered in section entitled "Information Disclosure Statement".

Applicant's arguments with respect to claims 59-62, 65, 67-74, and 81-91 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John P. Dulka whose telephone number is (571)-270-7398. The examiner can normally be reached on Mon-Thurs: 7:30am-5:00pm; Fri: 7:30am-4:00pm. Every other Friday Off. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, N. Drew Richards can be reached on (571)-272-1736. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or (571)-272-1000.

/Fernando L. Toledo/
Primary Examiner, Art Unit 2895

10/21/2009
/J. P. D./
Examiner, Art Unit 2895